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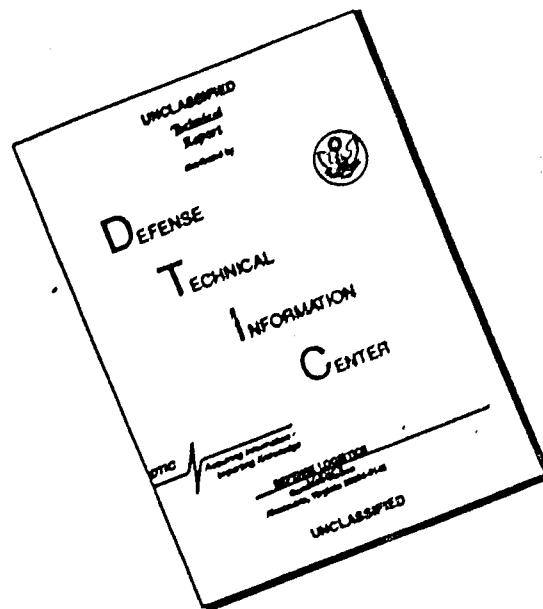
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HEADQUARTERS
20TH ENGINEER BATTALION (COMBAT)
APO San Francisco 96318

14 May 1967

EGC 20E-3

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65), for Quarterly
Period Ending 30 April 1967

THRU: Commanding Officer
937th Engineer Group (Cbt)
APO 96318

Commanding General
18th Engineer Brigade
APO 96307

Commanding General
United States Army Engineer Command (Prov)
ATTN: AVCC-EC
APO 96491

Commanding General
United States Army, Vietnam
ATTN: AVC-JH
APO 96307

TO: Assistant Chief of Staff for Force Development
Department of the Army (ACSFOR DA),
Washington, D. C. 20310

Section 1. Significant Organization or Unit Activities.

a. General:

At the beginning of the reporting period, the Battalion Headquarters, Headquarters Company, Company A and the 534th Engineer Company (LE) were located in the 4th Division's Dragon Mountain Base Camp at Pleiku, Republic of Vietnam. Company A was engaged in base camp cantonment construction. The 534th (LE) Company (-), was providing direct support of Quarry Operations and equipment support for the Combat Engineer Companies. Company B (-) was located at Phu Tuc and was nearing completion of a C-130 Airfield and FASH (forward assault heliport) area. The third platoon of Company B was supporting Company D, 35th Engineer Battalion (attached to the 20th Engineer Bn) in the installation of MX-19 matting at the New Poley Djereng C-130 Airfield. Company C (-) was preparing to move from Ban Kioch following completion of an airfield repair project.

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On 1 February 1967, Company C (-) began a long distance move from Ban Blech to Duc Lap to construct a new C-130 Airfield. Due to the fact that Duc Lap was so far removed from Battalion Headquarters, approximately 150 road miles through unsecure territory, and because there was no existing airfield facility to effect receipt of supplies, all construction materials, POL and rations for the project were assembled and loaded on a convoy originating at Battalion Headquarters in Pleiku and delivered to Company C at Ban Blech in the early afternoon of 1 February. After the supply convoy married up with the Company convoy, the journey to Duc Lap proceeded with a stopover in Ban Me Thuot that same evening.

The next day, 2 February 1967, the Company departed Ban Me Thuot and at 0915 hours arrived at the Ea Krong River crossing site, about 10 kilometers southwest of Ban Me Thuot. Of the 117 vehicles in the convoy, approximately 80 could travel over the limited class bridge while the remainder had to use a four float reinforced M426 raft which was specially constructed for this convoy. River crossing operations were completed at 1530 hours and the march continued to Duc Lap. At 2000 hours the convoy completed closing into Duc Lap.

Work on the project began on 4 February 1967 with clearing operations and the moving of a village which was located on the east end of the Airfield centerline. Scope of work for this project consisted of building a C-130, T-17 membrane covered airstrip and parking apron to accommodate five C-130 Aircraft. In addition, a two way all weather access road, approximately three miles long from Route QL-14 to the Special Forces Camp, which provided bivouac and job site security, was required.

On 2 February 1967, Company D, 35th Engineer Battalion relocated to Oasis, vicinity ZA 1128, to rehabilitate the existing 3,000 foot runway at this location to C-130 criteria, provide parking facilities for 5 C-130 aircraft and to construct a FASH area for 40 helicopters. The existing airfield had been covered with T-17 membrane which was severely damaged by constant use and the airfield drainage had failed, causing deep ruts in the runway. The new 3,500 foot runway was to be covered with MK-18 and the C-130 parking apron with M8A2.

On 7 February 1967, the Third Platoon, Company C, closed in the Battalion base camp after extending Route 509E approximately 11,000 meters to the northwest and constructing two fire support bases.

On 17 February 1967, the Third Platoon, Company C, departed base camp for Phu Nhon to engage in an airfield repair project. This C-130 Airfield had fallen into a serious state of disrepair with many ruts, soft spots, drainage problems, and severe damage of the T-17 membrane.

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On 4 March 1967, the Third Platoon, Company B, returned to base camp after completing its mission of laying MX-19 on the Polei Djereng Airfield and completing the construction of two 32' long, pile bent, timber, class 55, bridges initiated by Company D, 35th Engineer Battalion.

On 12 March 1967, Company B (-), completed its mission at Phu Tuc. The scope of the work as outlined in the project directive was to construct a C-130 Airfield in the vicinity of the Phu Tuc Special Forces Camp by extending an existing 2,200' earth runway to 3,500' and surfacing it with T-17 membrane. The runway was constructed in accordance with MACV TB 415-2-1. In addition, parking facilities for five C-130 Aircraft, a forward assault heliport for three Airmobile Companies, two turn-arounds and a 5,300' access road from Route 7B to the FASH area were constructed. On 14 March 1967, Company B (-), returned to Dragon Mountain Base Camp. On 16 March 1967, the 1st Platoon Company A relocated to the Danner (Oasis) Quarry and began commuting daily to construct an 80 foot pile bent bridge on Route 14B.

On 16 March 1967, Company D, 299th Engineer Battalion (C) was attached to the 20th Engineer Battalion to support base camp development of the 4th Infantry Division Headquarters at Dragon Mountain Base Camp, Pleiku.

On 21 March 1967, Company D, 35th Engineer Bn completed construction of an 80' long, 3 span, timber, pile bent, class 60 bridge near the Oasis Airfield.

On 27 March 1967, the Third Platoon, Company C, closed in at a bivouac site on Route 502 to begin work on a 30 foot, four span, timber, class 55 bridge with masonry abutments, rock log crib center pier, and two post bents with concrete footers as intermediate supports.

On 3 April 1967, the 80' pile bent bridge on 14B was completed by 1st Platoon, Company A.

On 7 April 1967, the Duc Lap Airfield/Road Complex was completed by Company C (-) and returned by convoy to Dragon Mountain Base Camp, closing on 8 April 1967.

On 13 April 1967, Company C (-) closed in its new bivouac site at Combined Arms hill vicinity YA898381 and began upgrading Route 14B.

On 16 April 1967, a squad from Company B closed at Ban Blech Special Forces Camp to make minor repairs on the existing C-130 Airfield.

On 23 April 1967, the squad from Company B completed airfield repairs at Ban Blech and returned to Dragon Mountain Base Camp.

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On 24 April 1967, the 80 foot four span bridge on Route 509 was completed by the Third Platoon, Company C, and the platoon returned to its company bivouac on Route 14B.

At the close of the reporting period, the Battalion was actively engaged in the following missions:

1. Oasis Airfield Rehabilitation -- OS-937/OS-66
2. Lines of Communications (OL-19W) -- 04-937/OS-66
3. Dragon Mountain Cantonment -- DC-66-236DC-937
4. Tank Maintenance Facility -- CD102-937/V-66
5. Upgrading of Route 14B -- 10-937/OS-66
6. Upgrading of Route 509 -- 08-937/OS-66
7. Rock Crusher and Quarry Operations -- 18-937/V-67
8. 4th Division Base Camp Interior Roads -- 01CC-P-851/07
9. 4th Division Base Camp Access Roads -- 01CC-458

b. Personnel:

The assigned strength of the 20th Engineer Battalion with its attached companies, the 564th Engineer Company (LE) and Company D, 35th Engineer Battalion (CBT), on 1 February 1967, was 34 Officers, 3 Warrant Officers and 922 Enlisted Personnel.

Personnel replacements were adequate during the period. Such critical positions as Battalion Executive Officer, Supply Technician, Personnel Sergeant, Squad Leaders, Supply Sergeants and Mess Sergeants were filled during the quarter. As of the last day of the period there were no critical shortages existing within the battalion.

On 16 March 1967, Company D, 299th Engineer Battalion (CBT) was attached to the 20th Engineer Battalion and was at full strength.

At the close of the reporting period, the battalion with its three attached companies had an assigned strength of 41 Officers, 4 Warrant Officers and 1,232 Enlisted Personnel.

During the reporting period the Battalion suffered no KIA's and 9 WIA's. Personnel of the Battalion received 6 Purple Heart Medals, with 3 Pending Approval, and 12 awards for Meritorious Service or Achievement with 17 more Pending Approval.

At present, the Battalion is employing 15 civilian Quarry workers and 35 civilian carpenters on a permanent hire basis. Future plans are to hire approximately 60 additional permanent civilian carpenters and maintenance

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workers as well as quarry workers. Additionally, an average of 125 AIK daily workers were hired during the period for the performance of general labor in various projects.

The Battalion Chaplain holds three Protestant Services on Sundays in the Battalion Chapel and on nearby project sites. To enhance the religious training within the Battalion, a film of a religious nature is shown on Sunday nights and complemented by the singing of hymns. A Catholic service is held each Thursday night in the Battalion Chapel and transportation is provided to various Catholic services within the base camp. An average of 214 men participated in the Battalion's religious services during the reporting period.

c. Intelligence and Security

During the reporting period the Battalion Intelligence Section continued to maintain contact with major units in the Pleiku area for contemporary combat engineer intelligence.

On 17 April 1967, a new OPLAN on base camp defense was initiated by the 4th Infantry Division. Though this OPLAN relieved the 20th Engineer Battalion of sole responsibility for a perimeter sub-sector, the Battalion is still required to augment Infantry personnel in manning the perimeter bunkers within the 1st Brigade Sector. The OPLAN further integrated the Battalion into the 4th Division's Village Visitation Program. Company B was assigned the responsibility of providing a 5 man team to visit designated villages and submitting periodic reports to the 4th Division G-5.

d. Operations and Training

(1) Dragon Mountain Base Camp

The responsibility for the construction, both vertical and horizontal, of the Division cantonment was assigned to Company A in November 1966.

The 4th Infantry Division now has an active self-help program. The program was set up prior to this reporting period but lack of materials and lack of interest hampered initial progress. Full scale production of prefabricated buildings did not start until early February. The Battalion Prefab Yard was operated on a 24 hour basis starting in early March and production increased to approximately 10 buildings per day. The yard was run during the day by 5 enlisted men and 60 indigenous carpenters. Approximately 15 enlisted men operated the yard at night. Total cantonment constructions completed by the end of the reporting period was:

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62,600	sq. ft. of mess halls
13,872	sq. ft. of maintenance facilities
4,220	sq. ft. of medical facilities
8,800	sq. ft. of administrative facilities
62,400	sq. ft. of troop housing

The Battalion Profab Yard had issued 252 - 20' x 80' buildings equivalents. In addition, the units of the 20th Engineer Battalion have constructed:

8 - 20' x 48'	Quonsets
3 - 40' x 100'	Warehouses
2 - 40' x 100'	Track Maintenance Facilities
3 - 26' x 98'	Automotive Maintenance Facility
1 - 26' x 104'	Automotive Maintenance Facility
1 - 26' x 104'	Automotive Maintenance Facility
1 - 26' x 78'	Automotive Maintenance Facility
1 - 20' x 200'	Mess Hall
1 - 20' x 116'	Mess Hall
1 - 20' x 120'	Mess Hall
11 - 20' x 100'	Tropical Buildings
3 - 20' x 50'	Tropical Buildings

On 4th Division Base Camp roads, the 20th Engineer Battalion has poured 24 culvert head walls, installed 13 checkdams, and placed and compacted 3,171 cubic yards of laterite.

On the 4th Division Interior Road Paving project the Battalion has prepared 4,198 meters of double lane subgrade, hauled and placed 4,445 meters of double lane 6" basecourse, and paved 5,752 meters of single lane road.

(2) 4th Infantry Division Special Staff Area

On 20 March 1966, Company B relieved Company A of the responsibility for the construction of the Division Special Staff Area complex. The project was completed on 18 April 1967 with the construction of eleven tropicalized (20' x 96') double quonsets and five (20' x 100') tropical buildings. In addition, a complete drainage system was designed and constructed for this sloping area.

Reconnaissance Missions

a. An engineer work estimate reconnaissance of Route 506 from Pleiku west to Pôlô Djereng was conducted on 4 February 1967 by the 3rd Platoon, Company B, to determine the engineer effort required to upgrade this route to a two way class 35, with one way class 50 bridges, all weather road.

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b. Reconnaissance of the roads and tank trails from the Duc Co Special Forces Camp south to the Chu Pong Mountain Range was conducted by the 3rd Platoon, Company C, on 15 to 17 February 1967 for the purpose of constructing a one way, class 12, fair weather road in this area. The mission was only partially completed due to security problems.

c. An engineer work estimate reconnaissance of Route 14B from intersection Route 509 to intersection QL-19W was conducted on 9 and 10 March by the Battalion S-2 to determine the engineer effort required to upgrade this route to a one way class 50, all weather road.

(4) Operational Support Missions

The Battalion received a substantial increase in the number of Operational Support missions assigned during this period. These missions included:

a. Upgrading of QL-19W and Route 14B. The opening phase consisted of the 1st Platoon of Company A, constructing an 80 foot pile bent bridge vicinity YA896305 to replace an AVLB tactical bridge. The platoon departed Dragon Mountain Base Camp on 16 March 1967 and established a bivouac at the Oasis Rock Quarry. From there the Platoon commuted daily to the bridge site, a distance of approximately 25 kilometers. This was required due to the lack of available security for the Platoon to establish its bivouac on the jobsite.

On 22 March 1967, the remainder of Company A moved to the Oasis Rock Quarry. Since security was not available for work to begin on the assigned portion of the road, the available resources were expended on QL-19 from the road junction vicinity Oasis Airfield westward. Some work was also accomplished constructing a new access road from QL-19W at ZA121238 to the Oasis Airfield.

On 30 March 1967, the closure of the 1st Brigade, 4th Infantry Division permitted Company A to move to the vicinity YA898313 into the 1st Brigade bivouac area. Work began immediately on Route 14B south from the bivouac area. A laterite pit was opened at YA894306. The road junction of Route 14B and QL-19 vicinity YA903270 was reached on 20 April 1967 and work effort began on the intersection and QL-19 eastward. Heavy thunderstorms, normally occurring in the evenings hampered progress on several occasions.

On 13 April 1967 Company C (-), departed base camp to begin work on 14B consisting of repairing the route to a one way class 50 all weather road. The third Platoon joined the Company in its Route 14B bivouac area on 16 April 1967 after completion of the 86 foot four span bridge on Route 509.

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Toward the close of the reporting period, the rate of progress on Route 14B was 0.3 kilometers per day. On 30 April 1967 the priority of the road was upgraded sharply, additional equipment was provided, and progress was increased to 0.6 kilometers per day. The deadline for completion of the road to the bridge vicinity YA975291 is 20 May 1967.

b. Completion of the Upgrading of Route 509B. Company C (-) moved to the vicinity of YA7450 in November of 1966 to continue a pioneer road previously initiated by the 4th Engineer Battalion. The responsibility of Company C (-) for the road designated Route 509B, began on the north shore of the Se San River.

Initially, the scope of work called for siting and constructing a one-way class 12 road from the Se San River vicinity YA741503 to a proposed C-130 airfield site vicinity YA6555. The road was to have turn outs at intervals of 300 meters or less and was to be sited so as to allow future expansion to a two-way, class 31 capability. In conjunction with the road construction, a mission was assigned to assist movement of Artillery units to forward location west of the Se San River and prepare firing positions along the route as required.

Almost immediately, the specifications for the road were upgraded to that of a well shaped, adequately drained, correctly oriented one-way road. Roadway width was to be 30' with a traveled way of 24'. To supplement the Company's equipment, two HD-16 dozers were fitted with Rome Plows (KG Clearing Blade). The Rome Plows were assigned to the project to expedite the cutting of the 30' wide path through the dense jungle.

Towards the end of November, enemy contact began to significantly drop off and on 6 December 1966 a change in the scheme of maneuver caused the temporary suspension of this project. At this time the following work had been accomplished:

- a. Cleared and grubbed from Se San River (vicinity YA741503) to vicinity YA698529 (5,500 meters).
- b. Graded from the Se San River to YA705525 (4,500 meters).
- c. Ditched from the Se San River to YA725515 (3,000 meters).
- d. Fire Support Base (250m x 250m) constructed vicinity YA731509.

On 2 January 1967, one Platoon of Company C moved across the Se San River to resume work on Route 509B. The Platoon was reinforced with two bulldozers and two Rome Plows. Work continued on pioneering the road to the northwest and constructing two Fire Support Bases. The project terminated on 7 February 1967. During this period of time the following work was accomplished:

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- a. Cleared and grubbed from YA698529 to vicinity YA688553 (7,000 meters).
- b. Rough graded with dozer from YA705525 to YA668553 (6,000 meters).
- c. Constructed two Fire Support Bases vicinity YA672541 and YA668553.

At the termination of the project, Route 509B was passable to traffic for its entire length.

c. Repair of Phu Nhon Airfield. The mission as originally received was to replace 200' of T-17 membrane which had been torn and removed, to make minor repairs to the rest of the membrane, and replace one culvert. The purpose of these repairs was to reopen the airfield which had been declared unsafe by Air Force pilots. This project was initiated on 18 February 1967 and completed on 24 February 1967. However, these repairs were not sufficient to allow the airfield to operate indefinitely. The 3rd Platoon of Company C returned to Phu Nhon on 7 March 1967. A series of repairs to correct soft spots and failures in the subgrade were undertaken and completed on 20 March 1967. These final repairs were sufficient to meet Air Force specifications and the Phu Nhon Airfield was re-opened to C-130 aircraft. Three tests landings by a C-130 were successfully made on 20 March 1967.

d. Completion of Phu Tuc Airfield Complex. The scope of work as outlined in the project directive was to construct a C-130 airfield by extending on existing 2,200' earth runway to 3,500' and surfacing it with T-17 membrane. In addition, parking facilities for five C-130 aircraft, a forward assault heliport (FASH) for three airmobile companies, two turn arounds and a 5,300' access road from Route 7B to the FASH area were to be constructed.

Construction was initiated on 29 September but progress was hampered by rainy weather for a considerable length of time. On 23 December 1966, two C-123 aircraft with payloads landed on the extended and capped airfield and found it to be in satisfactory condition. On 30 December 1966 C-123 aircraft began delivering T-17 membrane to be used as airfield surfacing.

Company B (-) began placing T-17 membrane on the runway on 21 February 1967 and the runway, parking aprons and turn arounds were completely covered on 10 March 1967. The final runway crown was 1.7%. A total of 92,253 cubic yards of decomposed granite was hauled. In late March 1967, a US Air Force C-130 aircraft made a standardization landing on the airfield and found it to be in excellent condition.

e. Repair and marking of the Ban Blech Airfield. The scope of work as directed, was to effect T-17 membrane repairs on the runway, parking apron, and parking apron access ramps and to mark the airfield for daytime tactical operations.

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A reconnaissance of the airfield was conducted on 14 April to determine the engineer effort required to perform the necessary repairs and complete the airfield marking. At that time the following defects were found:

1. A few T-17 gluing strips had come loose under aircraft traffic and required re-gluing.
2. There were several rips in the membrane on the parking apron where corners of pallets dropped from parked aircraft had ruptured the membrane.
3. Several rocks were protruding from the base course on the parking apron and were stretching the T-17 upward.

On 15 April, work was initiated at the Dragon Mountain Base Camp to prefabricate the required runway panel markers and the wind sock.

After the arrival of the repair squad from Company B on site, a careful survey was made of the entire runway and parking apron and all rips, rocks, and insecure seams were marked with chalk.

The rips and loose seams were repaired by applying T-17 adhesive directly or installing a patch on the torn surface. Approximately 1,500 linear feet of T-17 seams were repaired.

All rocks protruding above the base course were removed by slitting the membrane and then patching it after removal. A total of 2,630 protruding rocks were removed.

The runway was marked with a two foot wide white stripe perpendicular to the runway centerline and 200 feet from the first safe touchdown point on both ends. Marker panels 2' x 10' were constructed from plywood, painted white, and placed on either side of the 200' mark on each end of the runway. The first safe touchdown points were marked with 18" wide 4' long stripes forming an "L" at each corner of the runway. A wind-sock was erected to complete the runway marking requirements.

The runway repairs and airfield markings were inspected on 21 April 1967 by a team from IFFORCEV and declared to be in excellent condition.

f. Duc Lap Airfield/Road Complex. The scope of the work as outlined in the project directive was to construct a C-130 airfield in the vicinity of the Duc Lap CIDG Camp in accordance with MACV TB 415-2-1. In addition, parking facilities for five C-130 aircraft, turn arounds, and a 2,700 meter access road following an existing trail from the CIDG Camp to Route QL-14 were to be constructed.

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Intensive planning took place during January 1967. Due to the remote location of the construction site resupply could be effected initially only by rotary wing aircraft or air-drop. Therefore emphasis was placed on all phases of logistics to insure that the required supplies accompanied the company on the initial convoy. This included thirty-three days of all classes of supply plus spare parts.

On 4 February Company C began operations with the relocation of a native village from the east end of the proposed runway. By 7 February this relocation had been accomplished concurrently with the clearing, grubbing and surveying of the airfield site. Preparation of the subgrade began on 8 February. On 15 February, 6 C-17A (Caribou) aircraft landed on the partially completed airstrip to resupply the Special Forces Camp.

A source of highly compactable, decomposed basaltic rock was located just north of the runway, vicinity YU901756. Between 17 February and 4 March, a six inch cap of this material was placed on the runway, graded and compacted with sheepsfoot and smooth wheel rollers.

On 2 March construction of the access road started with clearing and grubbing operations and emplacement of a quadruple 48" culvert at a stream crossing. Excessive drainage problems along the existing trail had caused a new route to be chosen along a ridge line from the airfield north to QL-14.

Placement of the two inch laterite buffer cap on the runway began on 12 March. A source of high grade pebble laterite had been located vicinity YU897760, and a Chinaman Loading Ramp was constructed to speed loading operations. Compaction was accomplished only with smooth wheel rollers to avoid pock marks which might entrap moisture under the T-17 membrane.

Laying of the T-17 membrane began on 16 March and the airfield construction was completed on 6 April. The access road was shaped and compacted over the entire length and a six inch laterite cap was placed from YU897760 to route QL-14.

A standardization landing was made by a C-130 aircraft in early April 1967 and the airfield was found to be in excellent condition.

(5) Training

The Battalion's basic 2 hour per week training program continued to be supplemented by an ambitious OJT training program, as well as attendance by battalion members at special courses sponsored by the 937th Engineer Group (Oct) and 18th Engineer Brigade.

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Emphasis in the training program has been directed toward accomplishment of assigned and potential future missions, and at orienting the individual soldier as to his duties and responsibilities.

(6) Supply

During this reporting period the Battalion began to increase its Class IV construction material receipts and issues to support maximum base camp construction during the monsoon season. The following quantities of major Class IV material were placed on requisition in support of approved construction projects:

Cement: 55,118 Bags
Lumber: 2,575,093 BF
Culvert: 1,712 LF

Nails: 74,432 lbs

In addition, the following materials were received and issued during the critical months of March and April for base development in the Dragon Mountain Base Camp (Bde # 66-236DC-937):

ITEM	RECEIVED	ISSUED
1 x 6 x RL	312,727 BF	190,803 BF
1 x 8 x RL	272,740 BF	58,644 BF
1 x 10 x RL	216,943 BF	242,824 BF
1 x 12 x RL	141,661 BF	84,702 BF
2 x 4 x RL	649,644 BF	432,513 BF
2 x 6 x RL	84,480 BF	53,385 BF
Corrugated Metal Roofing	34,688 SH	36,794 SH
Nails 8d	16,831 lbs	10,646 lbs
Nails 12d	11,862 lbs	7,894 lbs
Nails 16d	12,971 lbs	10,249 lbs

A heavy increase in the amount of bridging timbers requisitioned, received and issued was necessitated by the construction of several timber trestle bridges as replacements for tactical bridging.

Due to the remote location of Companies B and C of this Battalion, it was necessary to effect resupply by aircraft. A rear supply detachment was established at Cam Ranh Bay to provide support for Company B at Phu Tuc and Company C at Duc Lap. Cam Ranh Bay was chosen as a base for support due to its extensive logistical facilities and the availability of C-7A aircraft for transporting supplies. Supplies, including repair parts, POL and rations were also flown to these companies from Pleiku Air Force Base and the Battalion Base Camp utilizing C-7A and C-123 aircraft. In addition, aircraft from the 937th Engineer Group (Cbt) were utilized as required.

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The Battalion water point teams continued operations in support of units performing construction missions outside the base camp and in support of the 4th Infantry DMBC. During the reporting period the water point teams produced 319,046 gallons of potable water and issued 248,037 gallons of potable water. Considerable difficulty has been encountered in maintaining the 10 KW, Kurtz-Root generators which power the 1,500 GPH water purification set. The non-availability of these sets caused by deadlined generators substantially decreased the production of potable water.

(7) Medical

During the quarter 1,672 out patients and 48 quarters patients were treated in the Battalion aid station. Among these patients there were no injuries or deaths attributed to combat.

The medical section has maintained a suspense file on immunization records to insure adequate and timely immunization of all personnel.

An aggressive anti-malaria program continues to be followed by the Battalion. Both Dapsone (DDS) and Chloroquine-primaquine tablets are included in this program. A very practical solution to insure the daily dosage of Dapsone for each man has been roster distribution at squad and section level. Constant checks are made to insure personnel make use of mosquito nets at night and follow the standard anti-malaria practices.

(8) Communications:

During this period it was noted that AM/VRC 46 radios which seemed to be in perfect working condition were constantly being turned in for repair. Upon investigation, it was found that often the matching unit and not the receiver-transmitter was at fault. Coordination with key communications personnel in each unit and advice on the thorough checking of each piece of equipment before it is turned in for repair has practically eliminated this problem area.

The Battalion has established and operated a communications relay station located on Dragon Mountain. This relay has provided reliable communications to all the remote project sites such as Duc Lap and Phu Tuc.

It has been found that the FM series radios if maintained properly are much more reliable than the AM radios. The new series FM radios have provided continuous communications up to three times their normal range.

(9) Maintenance

Supply of repair parts still remains the major problem in the maintenance field. Such direct exchange items as voltage regulators, generators, brake cylinders (wheel and master), and brake shoes for all types of vehicles are in short supply. Requisition spare parts have improved,

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but some items require 30 to 45 days to be replaced. During the closing days of the reporting period inner tubes (size: 1100 x 20, 900 x 16, and 700 x 15) became critical items.

The field maintenance units in direct support of the Battalions have done an outstanding job in supporting the remote companies with contact teams and repair parts.

The D7E tractors have not presented a significant maintenance problem since the installation of grill guards constructed from MB PSP.

The 25 ton trailer, M173A1, has not been holding up with sustained operations over the Vietnamese roads. Several cracks have developed in goose necks and walking beams necessitating the salvage of these trailers.

The Japanese manufactured concrete mixers are performing well. A modification in the main drive shaft has been made by replacing the original shaft with 4" steel stock supported on 2 3/4" legs fabricated from reinforcing steel. This modification has proven highly successful.

2. COMMANDER'S OBSERVATIONS AND RECOMMENDATIONS:

Part I. Observation:

a. Personnel: None

b. Operations:

(1) Item: Guidance for Rome Plow Operations

Discussion: When Route 509B was initiated, a method of guiding the plows had to be devised. Many times the plow worked so fast that it sometimes went off into the wrong direction from the planned path of the road. This resulted primarily from the fact that the individual guiding the plow had to remain from 50 to 150 feet behind it to prevent being struck by falling trees. The operator in order to get his bearings had to stop the plow and receive guidance from the individual who had plotted the route. In order to overcome this problem, a PRC/25 radio was issued to the assistant operator and one to an individual on the marked route about 100 meters in front of the plow. The man in front could then give instructions to the assistant operator who would in turn inform the operator of the correct path to follow.

Observation: In order to expedite work and facilitate guidance for Rome Plow clearing operations, it is suggested that radio communication be used between the assistant operator and the individual guiding the operation.

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(2) Item: Driving T-17 Anchor Pins

Discussion: On the highly compacted surface at the Duc Lap Airfield, about 50 blows of a wooden mallet were required to drive the T-17 anchor pins. The pavement breaker with tamper attachment from the 250 CFM air compressor set was utilized with very successful results. Two personnel and no modifications of equipment were required. Pins were driven in one quarter of the time required for a mallet or sledge and with an absolute minimum expenditure of effort.

Observation: Since a high CBR is desired on all airfield surfaces which result in difficulties in driving T-17 anchor pins, all available methods should be tried to minimize expenditures of time and effort for the driving operations. The pavement breaker with tamper has been the best method tried by this unit to date.

(3) Item: Anchor Pins for T-17 membrane

Discussion: It was discovered that approximately 10% of the heads break off the anchor pins or the pin bends. If the pin bends, subsequent straightening weakens the pin and it bends again.

Observation: If pins bend, they should be replaced with a new section of, 5/8" reinforcing steel. It is recommended that several sections of 5/8" reinforcing steel be ordered for T-17 jobs.

(4) Item: Tightening T-17 membrane

Discussion: It is desirable to have as few wrinkles as possible when laying T-17. Because of its weight and peculiar stretching characteristics, it is difficult to stretch it tightly unless many men are available.

Observation: T-17 can be tightened effectively with a grader by running its wheels in the anchor ditches while rubbing against the membrane. This method is very effective for traverse wrinkles. Longitudinal wrinkles can be removed by putting a 3/4 ton truck approximately two thirds of the way down a sheet of membrane. A 5 ton truck pulling the 3/4 ton while it alternately breaks and releases will remove most of the remaining wrinkles.

(5) Item: Installation of laterite cap

Discussion: While installing the laterite cap on the Duc Lap Airfield, it was discovered that the material was drying before final grading and compaction could be accomplished, causing the clay binder to powder and blow away. This condition was corrected by applying a heavy coat

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of water to the subgrade immediately before spreading the cap material. The application of water should be heavy enough to make the surface of the subgrade soft and should cover only the area that can be immediately covered with the cap material.

Observation: Retaining moisture in the cap material throughout grading and compacting operations is important to maintain a homogeneous mixture. Applying water to the subgrade before laying of the cap material was the most effective method. As the water tries to evaporate, it must pass through the cap material; thus keeping it moist.

(6) Item: Expedient Bolts

Discussion: Large bolts were needed for several applications in the construction of a four span bridge on Route 509. Because of the size required and the existing logistical problems, the bolts were unattainable. Sway bracing from a damaged Bailey Bridge on site was cut to the appropriate lengths. Holes were drilled into the expedient bolts and nails were placed in the holes to anchor the bolt when it was set in concrete.

Observation: Damaged Bailey Sway Bracing may be salvaged and used as bolt material.

(7) Item: Expedient forge

Discussion: A method was needed to straighten bent sections of Bailey Sway Bracing. The sections could be readily straightened by use of heat but no standard heating means were available. A circular pit 2 feet in diameter was dug in the soil to a depth of 1½ feet. A small trench was dug radially to the pit so that the total excavation had the configuration of a key hole. A 105mm shell casing with a hole punched into the solid end was placed into the trench and earth filled over it. An air hose from a 5 ton dump truck was then attached to the shell casing to provide a draft. Charcoal which had been made prior to the construction of the forge was then placed in the pit and allowed to heat. Within 15 minutes the steel had reached a cherry red and could be easily worked.

Observation: An effective forge may be constructed rapidly and with little effort using materials on hand.

(8) Item: Concrete Bucket

Discussion: A means was needed to transport concrete from the mixer and pour it into a rather confined area. The top of a 55 gallon drum was removed and 2 holes punched through on opposite sides under the top rim. Cable was then drawn through those holes to support the drum when lifted

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by a crane. A hole was made in the bottom of the container near the rim and a cable secured through it. The lower cable was then attached to one of the central cables of the crane; by use of this cable the drum could be tipped and the concrete poured out.

Observation: A concrete pouring bucket can be easily fabricated from a 55 gallon container and is exceptionally valuable when pouring in confined spaces.

(9) Item: Asphalt Deliveries

Discussion: It was found after the first delivery of asphalt drums that the unloading techniques were unfavorable. Of the first shipment, 50 drums were lost due to leakage. The gauge of metal from which the drums are made is very light and the seams split open very easily. By using planks as a ramp from the truck to a gradual hill of sandbags, the drums moved smoothly without hitting a solid object.

Observation: Drums being loaded and unloaded in this manner will alleviate to a great degree the problem of leaks and split seams.

(10) Item: Artillery Pads

Discussion: During construction of the artillery pads, it was determined that a crown should be present on each pad to insure proper drainage. After a crown was established, the gun was placed on the pad to check the allowable cant on the piece. At this time it was discovered that the crown would have to be lowered since the spade rest did not fit the backstop.

Observation: By lowering the crown the spade rest did fit in its proper location. It should be noted that the cant of 175mm guns cannot exceed 20 mils; All pads must conform to these standards and drainage solved otherwise than by using a high crown.

(11) Item: Reinforcing 4' overhang on 20' x 100' tropical buildings

Discussion: The 4' overhang on the ends of 20' x 100' tropical buildings was found to be difficult to prevent from sagging at the ends. The purlins were 1" x 4" material and were not strong enough to compensate for the weight of the corrugated roofing. Double 1" x 4"s were used as stiffeners but there was still a noticeable sag.

Observation: 2" x 6"s were used as stiffeners and were tied into the last two rafters at each purlin. Although it was time consuming, it has proven to be the best means of removing the sag. Also, if the overhang

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is reduced to 2' instead of being 4'. The stiffeners are not required and saves 8 man hours per building.

(12) Item: Location of Purlins on 20' x 100' Tropical Buildings

Discussion: As corrugated roofing comes in lengths of 6', 8' and 10' sections, it is necessary to insure purlin spacings deviate to accommodate these sizes. If standard plans are followed, roofing cannot be nailed down correctly.

Observation: The size roofing should dictate purlin spacing and roofing should be drawn prior to nailing purlins to insure correct spacing.

(13) Item: Nailing Heavy Gauge Corrugated Roofing

Discussion: Driving nails through heavy gauge corrugated roofing is very difficult and time consuming.

Observation: Roofing should be pre-punched or drilled prior to nailing on roof. This can be accomplished either by drilling nail holes in several sheets at a time or using a steel punch and hammer.

(14) Item: Nails for Roofing

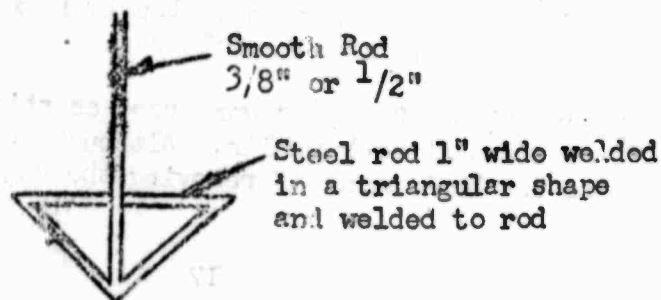
Discussion: Roofing nails with neoprene washers are in short supply.

Observation: Common nails with washers made from salvaged inner tubes serve as effective substitutes.

(15) Item: Mixing Nonskid Compound

Discussion: Mixing the nonskid compound is a time consuming task and utilizes many personnel.

Observation: A paint mixer was fabricated to use with the heavy duty electric drills in the pioneer electrical tool sets. This method was quicker and required fewer people. The design is as follows:



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(16) Item: Laying of M8A1 Airfield Matting

Discussion: When planning to cover a 150' x 750' C-130 parking apron with M8A1 airfield matting, it was determined that 419 bundles of M8A1 were required. This was computed from the laying coverage given per bundle in TM 5-306 dated November 1965 and from the fact that there are thirteen full panels and two half panels of M8A1 in each bundle. When actual laying of the M8A1 was initiated, it was discovered that the two half panels in each bundle only had locking bars on one end. As a result, half panels could only be used on the side of the parking apron and an additional 40 bundles of M8A1 were required to complete the parking apron.

Observation: The coverage in square footage per bundle of M8A1 as listed in the appropriate TM's does not take into account the necessity of using half panels on the edge of the area to be covered. When constructing a large rectangular area such as a parking apron calculations must be included to determine the extra bundles required for completion.

(17) Item: Driver Incentive Awards Program

Discussion: Commanders have found themselves to be somewhat at a loss in developing equitable programs for driver incentive. The problem is that the driver is "Under the Gun"; An accident or a deadlined vehicle caused through operator maintenance negligence can often lead to non-judicial punishment which could include fine and reduction. Since the majority of drivers are in the authorized pay grade of 3³/₄ (E-4), it is found hard to say, "If you do a poor job I will fine you and reduce you"; To be equitable we should be able to say, "If you do a good job I can promote you (which is unauthorized) and reward you".

Observation: The solution of transferring a driver to a promotable slot is not too highly regarded since a majority of drivers want to continue driving. This leaves only the reward system to show recognition. A recently initiated program within this unit appears to be off to a good start. Of the monthly in-country R&R allocations given to this unit, one allocation is reserved for Drivers Only. The Company's driver of the month, based on accident free miles, least down time on his vehicle and the operator's proficiency in his echelon of maintenance, gets the 3 day pass to Vung Tau. An added and hidden bonus for the program is that a noticeable change has been seen in the increase of total weekly mileage and less deadline time. A truck that spends one day in the motor pool for maintenance is almost out of the running for the R&R program.

Part II. Recommendations: NONE

- 1 Incl
- 1. Organizational Structure, 20th Engineer Battalion

Robert L. Gilmore
ROBERT L. GILMORE
LTC, CE
Commanding

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24 May 1967

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65), for Quarterly
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- 5 - CG, 18th Engr Bn, ATTN: AVBG-3
- 10 - CO, 937th Engr Gp, ATTN: EPC-3
- 1 - File
- 10 - Reference

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29 MAY 1967

EGC-CO (14 May 67)

1st Ind

SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65), for Quarterly Period Ending 30 April 1967.

DEPARTMENT OF THE ARMY, HEADQUARTERS, 937TH ENGINEER GROUP (COMBAT), APO 96318, 27 May 1967

TO: Commanding General, 18th Engineer Brigade, ATTN: AVDC-C, APO 96377

1. The subject report, submitted by the 20th Engineer Battalion (Combat), has been reviewed and is considered a well compiled report of organizational activities.

2. I concur in the observations of the Battalion Commander.

E. P. Braucher

E. P. BRAUCHER
Colonel, CE
Commanding



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AVBC-C (14 May 67) 2nd Ind Cpt Mills/rsg/DBT-163
SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65) for the
Quarterly Period Ending 30 April 1967

Headquarters, 18th Engineer Brigade, APO US Forces 96377 4 JUN 1967

TO: Commanding General, U.S. Army Engineer Command, Vietnam, (Prov),
ATTN: AVCC-P&O, APO US Forces 96491

1. This headquarters has reviewed the Operational Report - Lessons Learned for the 20th Engineer Battalion (Combat) for the period ending 30 April 1967, and considers it an adequate report of unit activities and accomplishments.

2. Concur with the observations of the Battalion Commander, with the additional comments:

a. Page 13, paragraph (6) - 10 KW Generators - Sufficient 10 KW generators are now available as replacement items. Frequent problems with these components of the 1,500 GPH water purification set have been due to running the generator for periods of 20 hours or more. Preventive maintenance services at 10 or 12 hour intervals is absolutely necessary in order to maintain these units in an operational condition.

b. Page 13, paragraph (9) - Maintenance - Inner tubes are no longer a critical supply problem due to recent deliveries in the Pleiku area.

c. Page 13, paragraph (9) - Maintenance - Replacements of salvaged M172 and M172A1 low bed trailers remains a critical supply problem. Over driving loaded trailers cross-country and on poor roads is a common cause of trailer damage, such as cracks in the frame and goose neck which lead to eventual loss of the trailer. On 5 May 1967, the 18th Engineer Brigade directed all units to initiate action to reinforce the frame main rails and goose neck in accordance to Change 2, TM-9-2330-211-14, which was reproduced and distributed to all units within the Brigade.

d. Page 15, paragraph b (4), Item: Tightening T-17 membrane - The use of a 3/4 ton and a 5 ton truck to tighten T-17 membrane probably causes undue wear on the clutch and brake systems of the vehicles. The use of a wheeled tractor, if available, would be more appropriate.

e. Page 17, paragraph (10), Item: Reinforcement of tropical buildings - Standard designs for tropical buildings call for 2" x 4" purlins and a 2' overhang on the ends of standard 20' x 100' tropical buildings to eliminate this problem.

AVBC-C (14 May 67)

SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65) for the
Quarterly Period Ending 30 April 1967

f. Page 19, paragraph (16), Item: Laying of M8A1 airfield matting - When calculating the amount of M8A1 required for an airfield, the matting necessary for anchorage must also be included. Since half panels are only able to be used as the outside panel, it is desirable to base all calculations on 13 full panels per bundle. This reduces the placing area per bundle from 268.8 square feet to 249.6 square feet. This will insure sufficient matting to complete an airfield.

g. Page 19, paragraph (17), Item: Driver Incentive Awards Program - A Driver Incentive Awards program should recognize all aspects of driving proficiency, particularly driver's performance of preventive maintenance, safe driving practice, and prompt reporting of maintenance deficiencies on his equipment. Frequently, a program relies solely on total mileage and least down time. More emphasis should be placed on the condition of the vehicle rather than the weekly mileage accumulated. The mileage factor leads to less maintenance which develops into major deficiencies, thereby shortening the vehicle life expectancy. It also must be considered that these vehicles are operating under unusual conditions when determining a job schedule. A review of roadside vehicle inspections and reports of survey indicate that too many vehicles are operating with faulty safety items and deficiencies that will cause further damage to the vehicle if its operation continues (i.e. a deadline item).



C.M. DUKE
Brigadier General, USA
Commanding

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AVCC-P&O (14 May 67)

3d Ind

CPT Hubbard/ccb/BH 404

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for Quarterly
Period Ending 30 April 1967

HEADQUARTERS, UNITED STATES ARMY ENGINEER COMMAND
VIETNAM (PROV), APO 96491 21 JUN 1967

TC: Commanding General, United States Army, Vietnam, ATTN: AVHGC-DH,
APO 96307

1. The subject report, submitted by the 20th Engineer Battalion (Cbt),
has been reviewed by this headquarters and is considered adequate.

2. The comments made by the submitting and Indorsing commanders have
been reviewed and this headquarters concurs, subject to the following added
comment:

Section 2, Part I, paragraph b(5), pages 15 and 16. When using this
technique careful control of moisture content is required. Excessive wetting
of the base will cause the laterite to become liquid.

FOR THE COMMANDER:



RICHARD J. DUCOTE
Colonel, GE
Chief of Staff

USARV, ATTN: AVHGC-DH

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AVHGC-DST (14 May 67)

4th Ind

SUBJECT: Operational Report-Lessons Learned for the Period Ending
30 April 1967 (RCS CSFOR-65) (U)

HEADQUARTERS, UNITED STATES ARMY VIETNAM, APO San Francisco 96307 6 JUL 1967

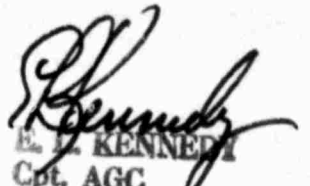
TO: Commander in Chief, United States Army, Pacific, ATTN: GPOP-OT,
APO 96558

1. This headquarters has reviewed the Operational Report-Lessons Learned for the period ending 30 April 1967 from Headquarters, 20th Engineer Battalion (Combat) as indorsed.

2. Reference item concerning the supply of repair parts remains a major problem, paragraph (9), page 13: This problem area will be investigated after identification of the maintenance DX unit. Innertubes are no longer a problem as indicated in paragraph 2c, 2d Indorsement.

FOR THE COMMANDER:

1 Incl
nc


E. J. KENNEDY
Cpt, AGC
Asst Adjutant General

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GPOP-DT (14 May 67) 5th Ind
SUBJECT: Operational Report for the Quarterly Period Ending 30 April 1967
from HQ, 20th Engr Bn (COMBAT) (RCS CSFOR-65)

HQ, US ARMY, PACIFIC, APO San Francisco 96558 2 6 SEP 1967

TO: Assistant Chief of Staff for Force Development, Department of the
Army, Washington, D. C. 20310

1. This headquarters has evaluated subject report and forwarding
inforsements and concurs in the report as indorsed.

2. Reference paragraph 2, 4th Indorsement. USARV has been requested
to inform this headquarters of any assistance required in overcoming the
DX repair problem.

FOR THE COMMANDER IN CHIEF:

Glencmullin
G. L. McMULLIN
MAJ, AGC
Asst AG

1 Incl
nc

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GPOP-DT (14 May 67)

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SUBJECT: Operational Report for the Quarterly Period Ending 30 April 1967
from HQ, 20th Engr Bn (COMBAT) (RCS GSFOR-65)

HQ, US ARMY, PACIFIC, APO San Francisco 96558 2 6 SEP 1967

TO: Assistant Chief of Staff for Force Development, Department of the
Army, Washington, D. C. 20310

1. This headquarters has evaluated subject report and forwarding
inforsements and concurs in the report as indorsed.

2. Reference paragraph 2, 4th Indorsement. USARV has been requested
to inform this headquarters of any assistance required in overcoming the
DX repair problem.

FOR THE COMMANDER IN CHIEF:

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G. L. McMULLIN
MAJ, AGC
Asst AG

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